



DOCTOR OF BUSINESS ADMINISTRATION

**ASSIGNMENT: VALUE CHAIN ANALYSIS**

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## ASSIGNMENT ON VALUE CHAIN ANALYSIS:

Conduct a value chain analysis for the sector(s) of your research. In addition to the generic ``types'' of stakeholders, add lists of organizations that will be the target for surveying or interviewing! Provide data sources for completing the list of organizations. In addition to your diagram, provide accompanying text that enables the reader to see how the various actors are linked to one another. The basic input for this assignment will be your contributions to the Round Table Workshops held in Maastricht, May, 2008.

## 1.0 THE VALUE CHAIN

My proposal for the DBA research program focuses on the following research title: *Is the biofuel industry in the SADC Region sustainable? An analysis of the biofuels industry in Zambia with a comparative analysis with Malawi.* In this research, two biofuels value chains will be studied as follows:

- (i) production of biodiesel and
- (ii) production of ethanol for blending with gasoline (petrol).

Since many feedstocks can produce these biofuels, this assignment focuses on the *Jatropha* Biodiesel Value Chain (JBVC). *Jatropha Curcas* (Box 1), for example, is being as a promising biodiesel feedstock.

### Box 1: *Jatropha Curcas* plant



*Jatropha* is a drought-resistant plant species which has been widely cultivated in certain African countries as a living fence.

Many parts of the plant are used in traditional medicine. The seeds, however, are toxic to humans, most animals and birds.



Considerable amounts of *Jatropha* seed were produced on the islands of Cape Verde during the first half of this century, constituting an important contribution to the country's economy. Seeds were exported to Lisbon and Marseille for oil extraction and soap production. Currently, global production is negligible.



The physic nut is a small tree or large shrub which lives for up to 50 years and can reach a height of up to five (5) meters if not pruned and kept under control. Growth and yield are determined by rainfall and temperature fluctuations.

Pollination of the physic nut is by insects and mostly by moths because of its sweet, heavy perfume at night.

The seeds are black, about two centimeters long and one centimetre thick. The extracted oil has no mutagenic properties, if handled with care, and poses no danger to workers.

Source: Kalumiana, 2006

In the Zambian context, the JBVC comprises three main segments as follows: Inputs, processes and outputs. These are described below:

- a) **Inputs segment:** This is the agricultural segment. In this segment, seed producers provide seeds to those who produce seedlings. This illustration fits most biofuel crops, e.g. *Jatropha*. The seedling producers sell their seedlings to those who plant them and finally produce the oil seed. Various opportunities exist in this segment for value addition. It is a very important component of the biofuel industry because it produces the raw materials from which the biofuel feedstock is derived. The segment presents enormous opportunities for wealth creation by creating jobs in the agricultural sector. Figure 1 further illustrates activities of this segment:
  
- b) **Processes:** This segment has two components: oil extraction and refining. These can be done both at small scale (on farms) or on an industrial scale. The segment also provides opportunities for value addition and consequently wealth creation through the creation of jobs and new markets. Figure 3 further illustrates activities of this segment:
  
- c) **Outputs:** This is the third and last segment with two components. It comprises the *oil distributors* and usually these will be Oil Marketing Companies (OMCs). The last component of this chain is the *oil retailing*, in which the biofuel products are sold to consumers. Figure 3 further illustrates activities of this segment. In between these components exist other components as well. For example, in the production of biodiesel, other products like glycerines, seed cake are also produced.

Figure 1 shows a schematic diagram of the inputs, processes and output components of the JBVC.

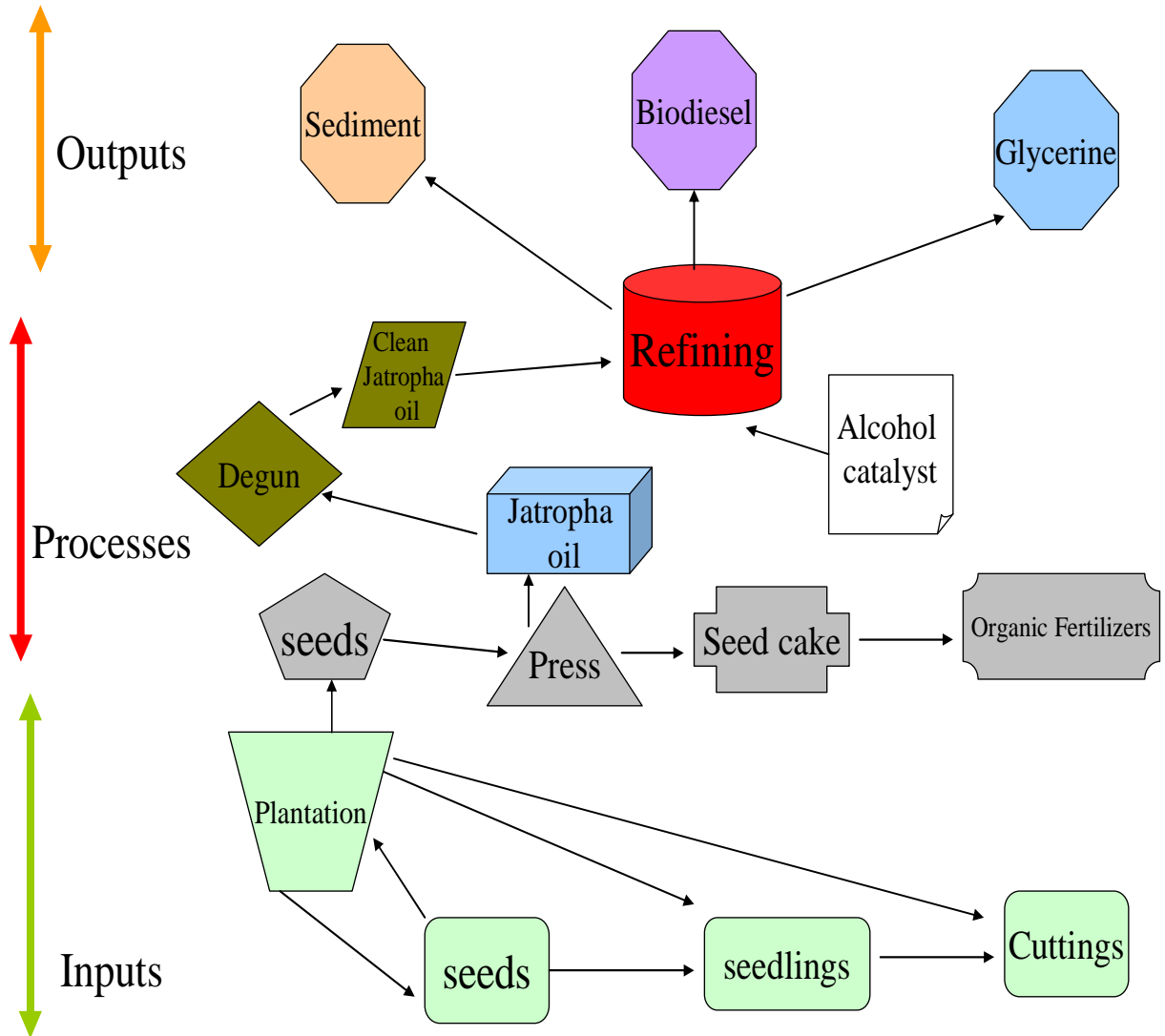


Figure 1: A schematic presentation of input, process and outputs chain for producing biodiesel from Jatropha.

Figure 2 shows a schematic presentation of the biodiesel technology development pathway from production to the market. This path, the value chain, begins with the production process involving farmers. At the production level, farmers produce the oilseed from oil is extracted. Other products include seed cake and glycerin, all of which account for 10% of the total products. Biodiesel, the major product account for 90% of the total production.

In between this segment and the market is the logistics segment, including transportation. The market segment includes the following: oil seed buyers, seed cake buyers, oil buyers, chemical products buyers as well as household liquid energy buyers.

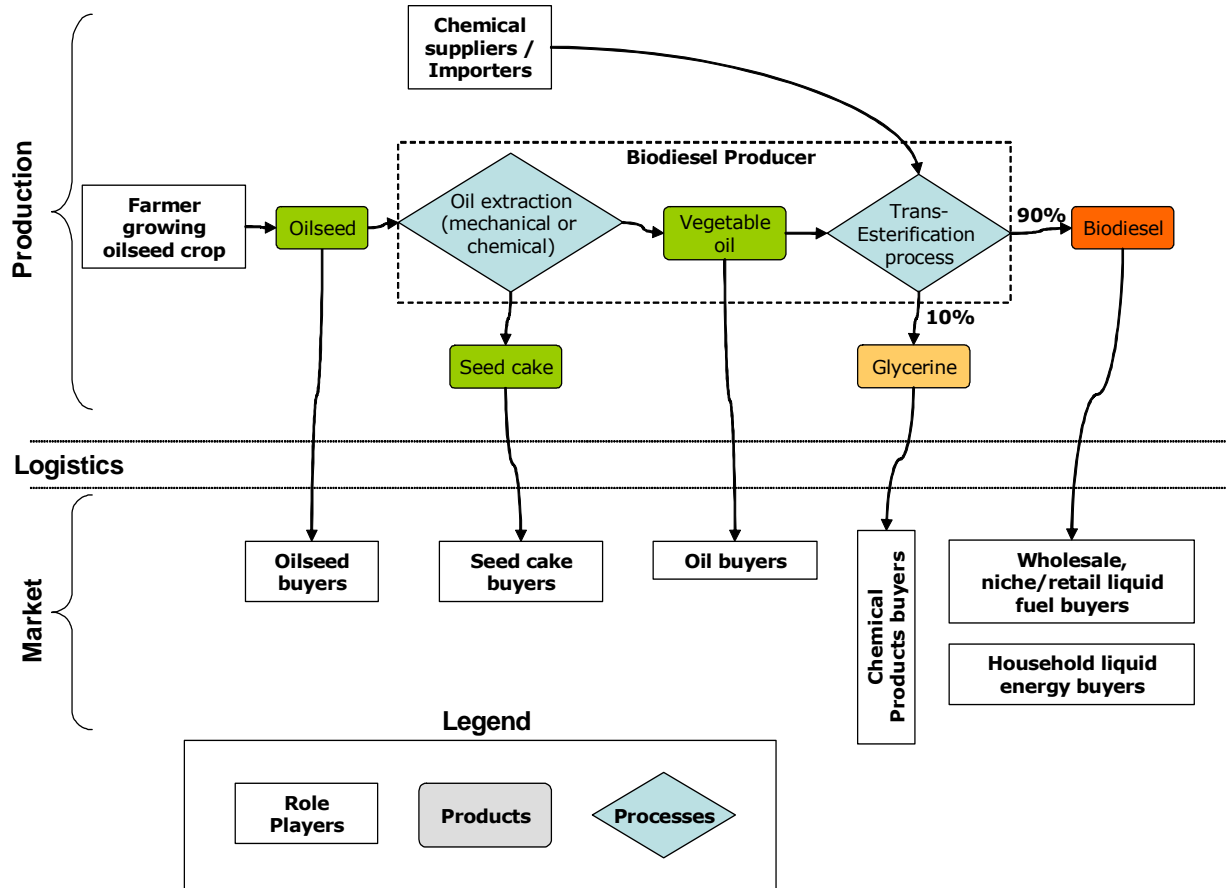


Figure 2: The Biodiesel technology pathway

Source: GTZ ProBEC, 2007

Figure 3 shows a simplified JBVC depicting the three major segments of the value chain, i.e. production, oil extraction and marketing. These segments of the JBVC presents opportunities for value addition as well as benefit sharing to various stakeholder including the rural poor. These include the following:

1. **Under the seeds segment:** Under this component stakeholders can:
  - a. Replant or sell seed
  - b. Process the seed to produce oil
  - c. Sell oil to processors
  - d. Sell biodiesel to refineries
  
2. **Under the oil segment:** Under this component stakeholders can:
  - a. Use the oil produced
  - b. Sell seed cake and other by-products
  - c. Sell oil to end-users, and
  - d. Sell oil to biodiesel refineries

e. Sell oil to processors

3. **Under the biodiesel segment:** Under this component stakeholders can:

- a. Sell biodiesel in the local market, or
- b. Sell biodiesel externally

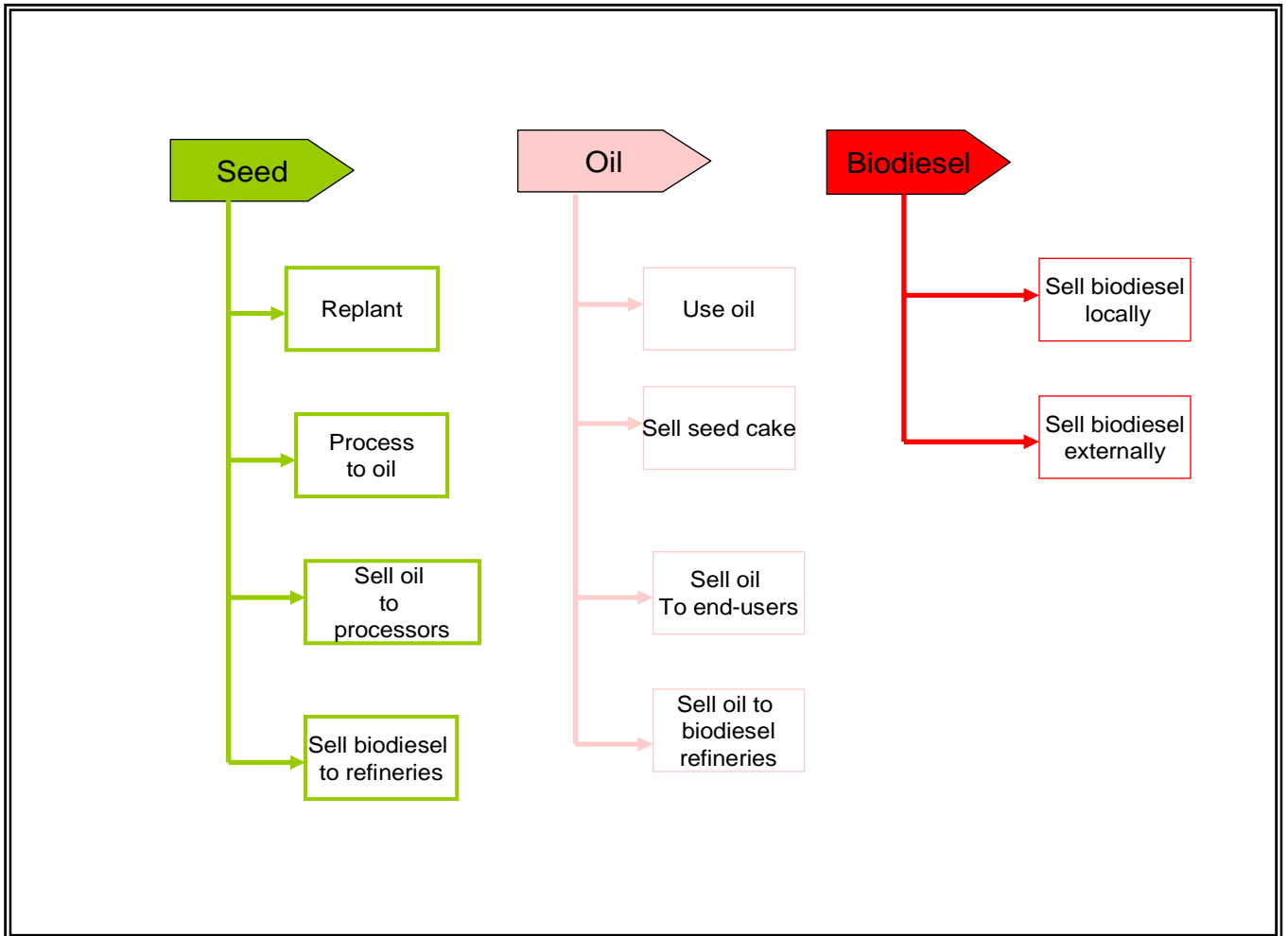


Figure 3: Opportunities for stakeholder participation in the JBVC

Source: Adapted after BDS, 2007

Detailed analysis of the JBCV will be undertaken as part of the DBA research process

## 2.0 STAKEHOLDERS IN THE BVC

The JBVC comprises various stakeholders. For the sake of this assignment, these are categorized based on the 3 main segments of the JBVC described above. Table 1 shows the stakeholders that my research will target for interviewing and/or surveying:

Table 1: Key stakeholders in the Zambian Biofuel Value Chain<sup>1</sup>

BVC Segment	Stakeholders	Role (s)
Inputs (Agricultural segment)	Government – Ministry of Agriculture and Cooperatives	<ul style="list-style-type: none"> <li>• Providing biofuel related agricultural policies and support</li> <li>• Carries out research on seed varieties, crop productivity, etc</li> </ul>
	Government – Ministry of lands	Providing policy on land for growing biofuel crops
	Seed growers/provides, e.g., <ul style="list-style-type: none"> <li>• Bruno Jatropha Nursery (Lusaka)</li> <li>• Zambia Seed Company, ZAMSEED</li> <li>• Panna Seeds Limited</li> </ul>	Provide seeds to farmers
	Large scale farmers; e.g: <ul style="list-style-type: none"> <li>• Ovals Biofuels</li> <li>• Marli Investments</li> <li>• Mpongwe Farms</li> <li>• Boimax Zambia</li> <li>• Equilibrium Consulting Ltd</li> </ul>	<ul style="list-style-type: none"> <li>• Growing biofuel crops</li> <li>• Contracting out grower farmers to provide oil seed</li> </ul>
	Out grower farmers	Proving oil seed to large scale farmers
	Independent small scale farmers	Proving oil seed for sale
	Fertilizer suppliers, e.g. <ul style="list-style-type: none"> <li>• Nitrogen Chemicals of Zambia</li> <li>• Nyiombo Investments</li> <li>• Sasol Fertilizers</li> </ul>	Sells fertilizers to farmers
	Research Institutions; e.g., <ul style="list-style-type: none"> <li>• University of Zambia (UNZA) School of Agriculture</li> <li>• National Institute for Scientific and Industrial Research (NISIR)</li> </ul>	Carries out research on seed varieties, crop productivity, etc
Processes segment (oil extraction/refining)	Small scale oil extractors (farm level) <sup>2</sup>	Extracts oil from seed at farm level
	Large scale oil extractors	Extracts oil from seed at farm level
	Oil refinery, e.g. Indeni Petroleum Refinery <sup>3</sup>	Refines oil into finished (white) products.

<sup>1</sup> Source: Ministry of Energy & Water Development Data base on biofuel stakeholders and results from preliminary data collection

<sup>2</sup> See Box 2

Outputs segment (fuel distributors/ retailers)	Ndola Fuel Terminal	Sells petroleum products on wholesale basis upon receipt from the Indeni Petroleum Refinery
	Oil Marketing Companies (OMCs), e.g. a. BP Zambia Limited b. Total Zambia Limited c. Engen Petroleum d. Caltexl Zambia Limited e. Petroda Zambia Limited f. Zambezi Oil Transport g. Agrofuel Zambia Limited h. Suban Petroleum	Distributes fuels ad lubricants to service stations and large consumers
	Services stations	Sells fuel to consumers
	Consumers:, e.g. • Industries • Transporters • Individuals	Consume fuels and lubricants
	Fuel exporters <sup>4</sup> • OMCs • Biomax Zambia • D1 Oils • Oval Biofuels	Export or plan to export fuel to external markets when the local demand is met

<sup>3</sup> Indeni Petroleum Refinery, Zambia’s only oil refinery has a design capacity of 1.1 million tones of oil refining annually. Currently slightly above 50% of the capacity is being utilized.

<sup>4</sup> Although still under discussion, Zambia plans to limit biofuels exports to finished products only, e.g. biodiesel or ethanol. This measure is intended to increases benefits to the country by only exporting higher value products instead of exporting oil seed, for example, which will be processed outside the country.

Box 2: Production of bio-diesel from *Jatropha Curcas* seed on a farm in Central Zambia. The farm consumes all the fuel it produces as well as produce electricity consumed on the farm



Photo credit: Department of Energy, 2006

### 3.0 REFERENCES

- (i) Germany Technical Agency, GTZ-ProBEC (2007). A biofuel crop decision-making tool for SADC, Version 3. GTZ ProBEC. Pretoria South Africa. Pp 11
- (ii) Kalumiana, O.S. (2006). Production and use o biofuels in Zambia. Zambia Country Proposal for the European Union Energy Initiative (EUEI). Risoe UNEP Centre. Risoe, Denmark. pp 7.
- (iii) Business Development Services Zambia (2007). An analysis of the Global Jatropha Industry and a Case Study of the local Value Chain in Zambia. International Labour Organization, Lusaka. Pp 29